AII.6 Operating Description of control Cabinets

Operating Description central GE Version 00

DATA 4

DC08.01 Milan

Backup power Station

8 * 3516 EHD 3250 kVA (2600 kW & cos(φ) = 0.8)

Operating description of Control Cabinets

Version 00

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1 OBJECT

The backup power station is composed by 8 gensets: Caterpillar 3516 EHD, 3250 kVA each (either a power of 2600 kW with a cos(φ)=0.8). Each genset individually supplies a TGT BQ (no synchronization between the four gensets).

Through the functional architecture of the backup power station, each genset is associated and managed by its own control cabinet, called "GE Cabinet". Each GE cabinet includes two Siemens' automatons (PLCs) which allowed an active redundancy. In case of any malfunctioning or misapplication of one automaton (Primary), the other automaton (Secondary) automatically carries out all the functions which concerned the genset.

As soon as the faulty PLC is operational again, the relay PLC continues to manage the operation of the control unit.

Each GE cabinet managed the auxiliaries of its associated genset.

In front face of each GE cabinet, there is a color touchscreen (HMI) which allowed:

- To visualize the different states, defaults and measures from the genset (Monitoring);
- To configure some functions of the genset;
- To communicate with the two PLCs.

4 Auxiliaries cabinets allow to manage the monitoring of the fuel system. Moreover, each Auxiliaries cabinet includes a 400VAC (3P+N) supply to electrically support the auxiliaries of a mobile genset or a load bank.

NOTA 1: All the circuit-breakers in the control unit are equipped with position feedback, which is controlled by the PLCs.

NOTA 2: ENERIA does not manage the load shedding request for chillers.

2 GE CABINETS

Each GE (genset) is associated and managed by its own GE cabinet,

The functions of GE cabinet are:

- Monitoring and protection of the GE;
- Start/Stop of the GE, according to the different operation modes.
- Opening and closing of the GE's circuit breaker on return from the plug (QGEX)
- Opening and closing of the load bank/mobile genset's electrical switch disconnector (IGEX)
- Controlling and protection of GE's auxiliaries
- Management of Degraded Operation
- To visualize the different states, defaults and measures from the genset (Monitoring);
- Monitoring of the different information through a colour touchscreen (HMI)
- Transmitting information to BMS by MODBUS communication (MODBUS TCP/IP) and by dry contacts (synthesis report)
- Fuel supplying management of the genset

Dimension of each GE cabinet (W x L x H)		
Width (W)	Length (L)	Height (H)
1600 mm	500 mm	1910 mm (+100 for base plate)

2.1 CONTENT

Each GE cabinet includes the following components:
- 2 Siemens redundant automations (CPU1513) ;
- 1 MODBUS RTU/TCP-IP Gateway ;
- Ethernet Switch;
- 2 States Selector Switch (YES/NO) for activating Degraded Operation (malfunctioning of the 2 PLC);

- Relaying for mobile genset management (START and STOP);

- 2 power supplies (25 kVA 400VAC 3P+N) with Automatic Transfer Switch (2 sources from different TGT BQ) used for supplying GE's auxiliaries;
- 2 Protected power supplies (24VCC) (one per energy block) for the command and control;

- Power supply to Jacket water heater;
- Power supply to circulation pump (associated to Jacket water heater);
- Power supply to generator space heater;
- Power supply to air insufflator (temperature servitude, PLC management and smoke extraction control);
- Power supply for the ventilation of the TGGE;
- 2 power supplies to fuel pump (pump 1 and pump 2) for filling day tank (In case of malfunctioning, automatic switching between pumps). Pump are supplying directly upstream the automatic transfer switch (each pump by one TGT BQ);

- 4 power supplies to each fuel valve (forward and return from main fuel tank 1 and main fuel tank 2). In case of low level of one main fuel tank, automatic switching on the other main fuel tank;

- 2 chargers for starter battery (NORMAL/ RESCUE);

Note: Chargers for starter battery are supplying directly upstream the automatic transfer switch (each charger for starter battery by one TGT BQ)

- Power supply for motorized dampers (air outlets);
- Relaying and protection to the different component useful for control and command system;
- Relaying to interface with other system;
- Power Supply to auxiliaries' cabinet (24VCC);
- Ventilation, lighting and door contact;
- LED Board for defaults monitoring in degraded operation.

Note: Two insufflators of each genset are directly supply by the alternators. Circuit breakers are boarded on gensets.

2.2 FRONT PANEL VIEW

The front panel of the GE cabinet contains the following devices:

- Colour touchscreen (HMI);

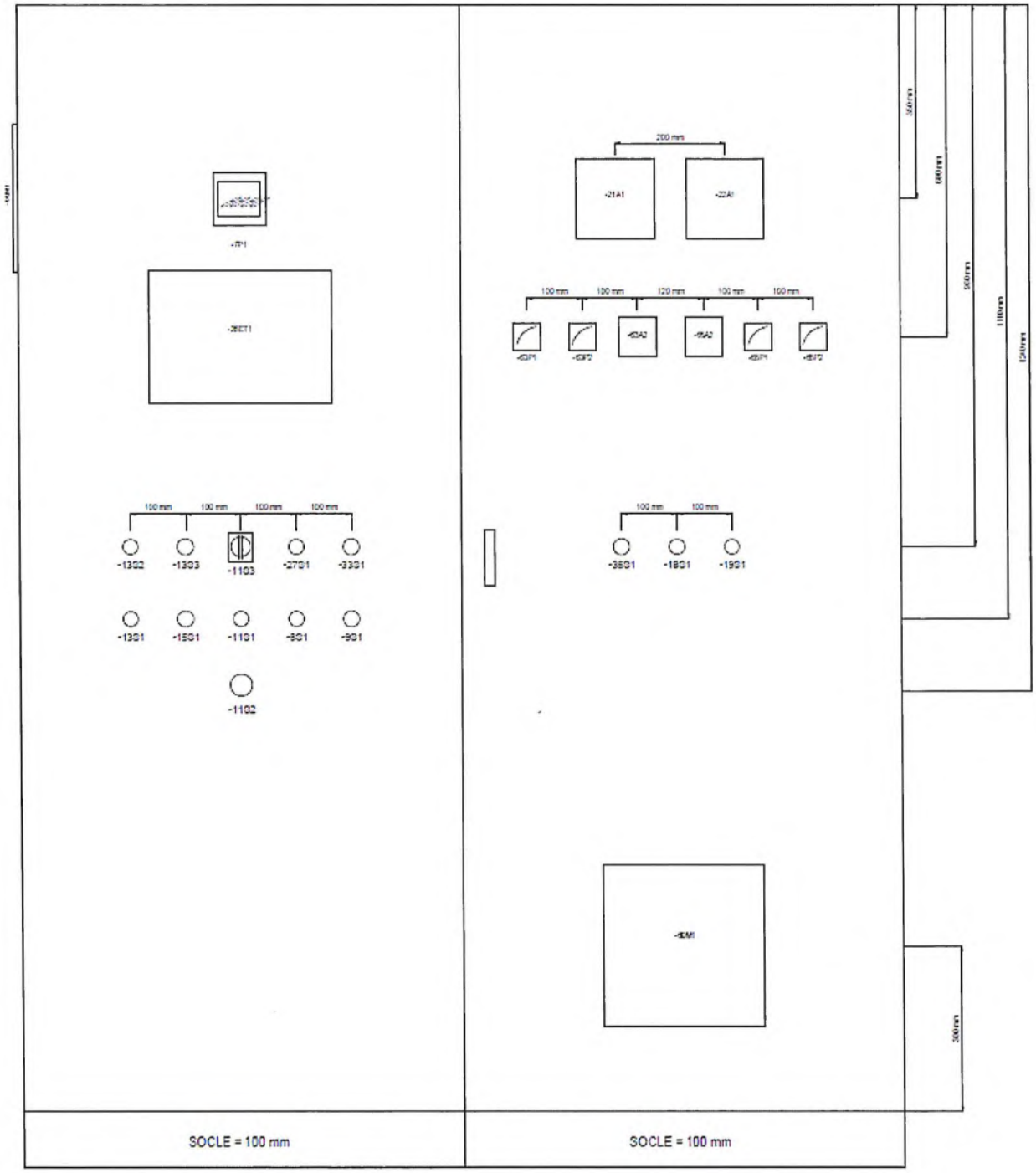
- LED Board:
* MAIN NETWORK SHUTDOWN
* GENERATOR VOLTAGE
* GENSET BREAKER CLOSED
* LOAD BANK / MOBILE GENSET SWITCH CLOSED
* GENERATOR UNAVAILABLE IN AUTO
* SYNTHESIS ALARMS GENSET
* SYNTHESIS SECURITIES GENSET
* FIRE DETECTION
* AUTOMATON DEFAULT
* EMERGENCY SHUTDOWN

- LED Board (2nd):
* AUXILIARIES VOLTAGE
* POMPIER VALVE CLOSED
* FUEL PUMP 1 DEFAULT
* FUEL PUMP 1 ON
* FUEL PUMP 2 DEFAULT
* FUEL PUMP 2 ON
* VERY HIGH LEVEL OF DAY FUEL TANK
* LOW LEVEL OF DAY FUEL TANK
* VERY LOW LEVEL OF DAY FUEL TANK
* HIGH LEVEL OF RETENTION TRAY OF DAY FUEL TANK

- 4 States Selector Switch for genset management (STOP/ AUTO/ MANU / TEST ON LOAD BANK);
- 3 States Selector Switch for genset breaker (QGEX) management (TRIGGER/ AUTO/ MANU);
- Push Button for genset breaker closing (ENCL);
- Push Button for genset start (ENCL);
- Push Button for genset stop (ENCL);
- 3 States Selector Switch for mobile genset electrical switch disconnector (IGEX) management (TRIGGER/ AUTO/ MANU);
- Push Button for mobile genset electrical switch disconnector (IGEX) closing (ENCL);
- 2 States Selector Switch for genset selection (GE/ GE EXTERIEUR);
- 2 States Selector Switch for starter priority selection (NORMAL/RESCUE);
- 2 States Selector Switch for Pump priority selection (PUMP 1/PUMP 2);
- Push button for manual fuel refilling;
- 3 States Selector Switch for priority fuel circuit selection (CIRCUIT 1/ AUTO/ CIRCUIT 2);
- Push button for Faults acknowledgement;
- Emergency stop push Button;
- Display of the starting batteries N°1 charge level
- Display of the starting batteries N°2 charge level
- Display of the energy block batteries N°1 charge level
- Display of the energy block batteries N°2 charge level
- Electrical measurement station (DIRIS).

2.3 FRONT VIEW OF GE CABINET

The GE cabinet front view is presented as an exemple.



3 Auxiliaries Cabinets

The functions of each Auxiliary cabinet are:

- Management and monitoring of Fuel tank's information;
- Electric distribution for supplying a mobile genset (400Vac 3P+N 25 kVA (Supply from a TGT BQ).

3.1 CONTENT

Each Auxiliary cabinet includes the following components:

- 1 Siemens' automation (CPU1212);
- 1 Siemens' remote module (ET200SP) (Monitoring of defaults by LEDS on front side of auxiliary cabinet and transmission to GTC);
- 2 Power Supplies from GE cabinet (24VCC) with diodes;
- 1 power supply (25 kVA 400VAC 3P+N) from a GE cabinet;
- 1 power supply 400VAC 3P+N to the mobile genset;
- 1 Rescue Power Supply;
- 1 power supply to leakage detector of main fuel tank (main fuel tanks 1 and 2 from auxiliary cabinet "1", main fuel tanks 3 and 4 from auxiliary cabinet "2", main fuel tanks 5 and 6 from auxiliary cabinet "3", main fuel tanks 7 and 8 from auxiliary cabinet "4");
- Power supply to fuel circuit interior and exterior leak detection;
- 1 level transmitter from main fuel tank;
- Ethernet Switch;
- Relaying and protections;

3.2 FRONT PANEL VIEW

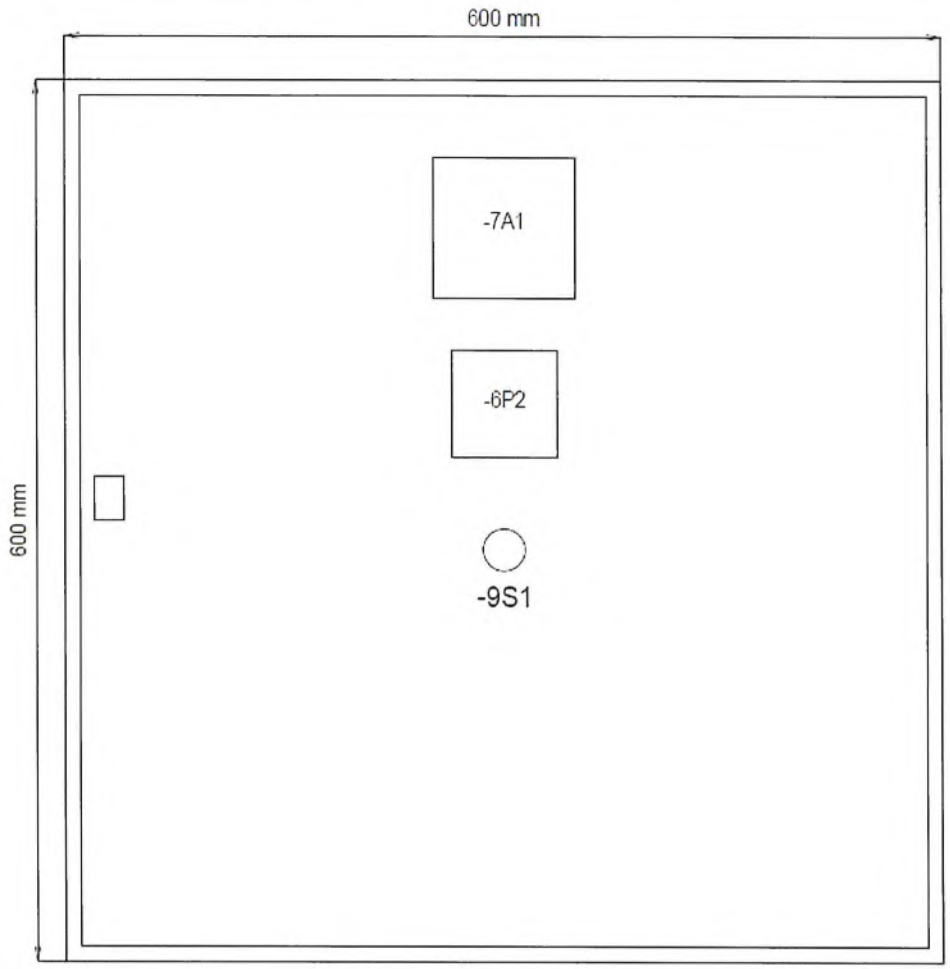
The front panel of the auxiliary cabinet contains the following devices:

- Level indicator of main fuel tank
- LED Board:

* 400V SUPPLY ON
* LEAKAGE DETECTION FROM MAIN FUEL TANK
* LOW LEVEL OF MAIN FUEL TANK
* LEAKAGE DETECTION FROM MAIN FUEL TANK
* DEFAULT SUPPLY OF LEAKAGE DETECTION
* AUTOMATON DEFAULT

- Push button for Faults acknowledgement

3.3 FRONT VIEW OF AUXILIAIRIES CABINET



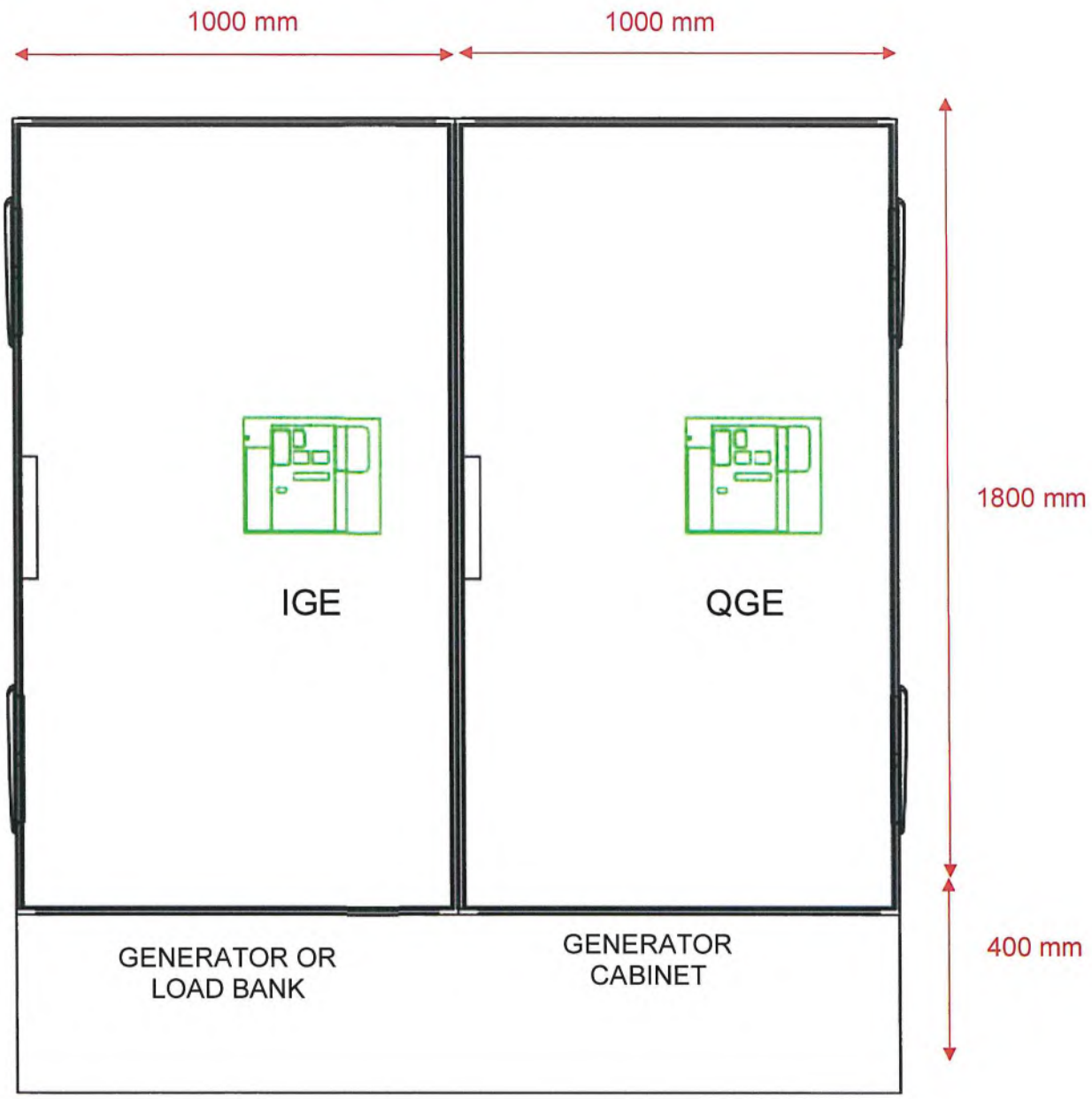
4 TGGE CABINETS

4.1 CONTENT

The TGGE cabinet is composed of the following elements:

- 5000A switch for the load bank/mobile genset arrival
- 5000A circuit breaker for the genset arrival
- 1 power circuit breaker for the TGGE cabinet ventilation
- 1 smoke extraction turret for the cabinet
- 2 cabinets cooling fans
- Relaying and various protection circuit breakers
- Relaying of interfaces with the site (see chapter "Site interfaces list")

4.2 FRONT VIEW OF THE TGGE CABINET



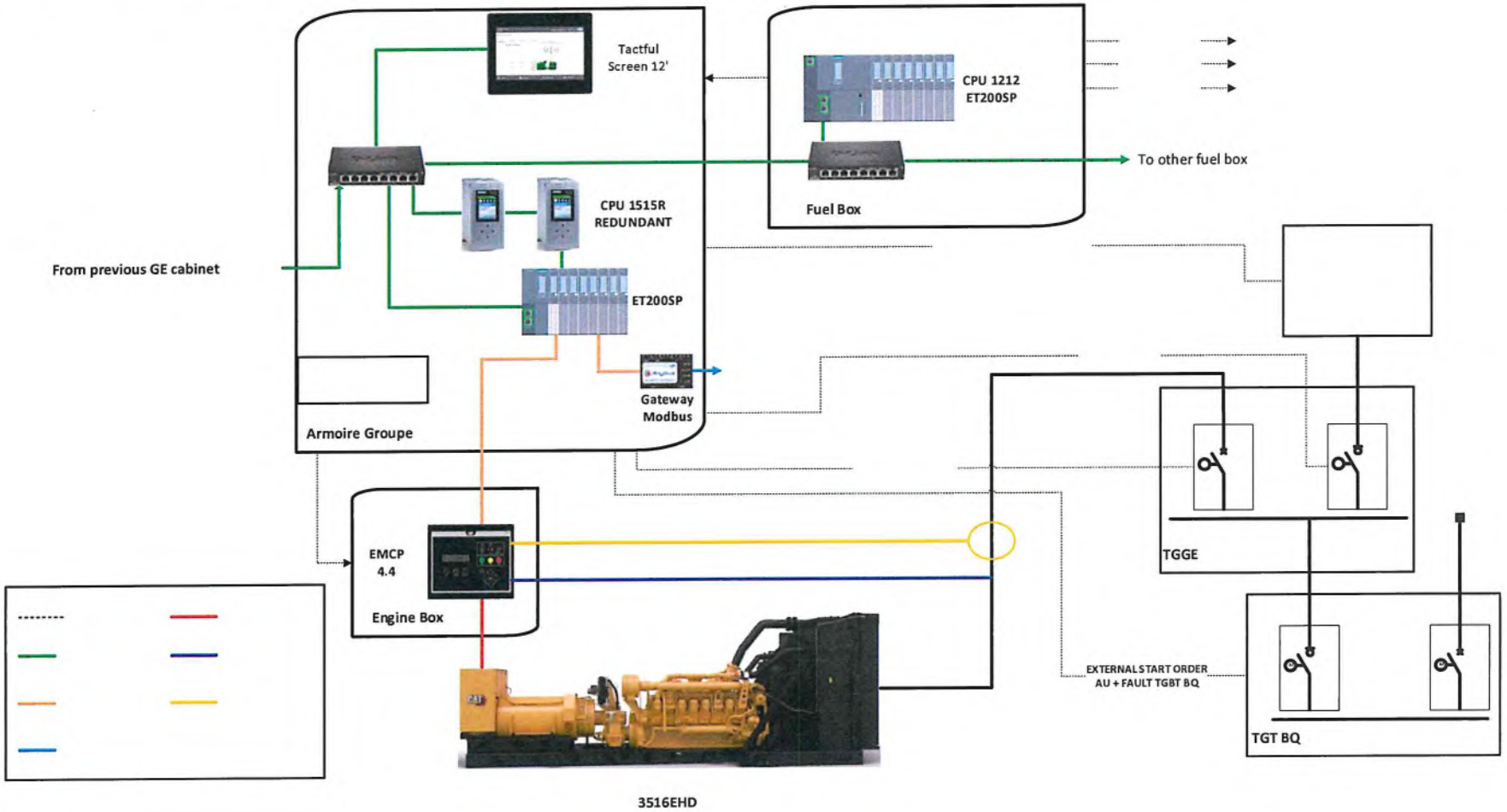
5 LOAD BANK/MOBILE GENSET CABINETS

5.1CONTENT

Each load bank/mobile genset cabinets include the following components:

- 1 power supply 400VAC 3P+N from an auxiliaries cabinet;
- 1 power supply 24VDC from the GE cabinets.

6 FUNCTIONAL ARCHITECTURE OF THE BACKUP POWER STATION



7 PRINCIPLE OF FUEL SYSTEM

7.1 COMPONENTS

The backup power station has two fuel systems, each system is assigned to 2 gensets.

A/ Fuel system of GEA and GEB

The fuel system of GEA and GEB is composed of:

- 2 main fuel tanks of 40 000 liters, each associated with its own fuel circuit (circuit 1 and circuit 2)
- 8 motorized valves (per GE: 2 fuel circuits composed of 1 flow valve and 1 return valve each) which allow to switch between the two fuel circuits;
- 2 day fuel tanks (1 per GE) connected to the two main fuel tanks (possibility to switch between the two).
- 4 pumps (2 per GE, pump 1 and pump 2) to convey the fuel from the main fuel tanks to the day fuel tanks.
- 2 "Pompier" valves (1 per GE) with safety contact to cut off the fuel circulation between the selected main fuel tank and the day fuel tank of the GE concerned.
- 2 "Police" valves (1 per GE) with safety contact to shut off the fuel flow between the GE and the day fuel tank of the GE.
- 2 fuse valves (1 per GE) with position contact in order to cut off (without human intervention) the fuel flow between the GE and the day fuel tank of the GE in case of fire.
- A leak detection station (VLR type), monitors the external double-walled pipes.
- A central leak detection station (Point Level Switch type), monitors leaks on the fuel oil network.

B/ Fuel system of GEC and GED

- The fuel system of GEC and GED is composed of:
- 2 main fuel tanks of 40 000 liters, each associated with its own fuel circuit (circuit 1 and circuit 2)
- 8 motorized valves (per GE: 2 per fuel circuit, 1 flow valve and 1 return valve) which allow to switch between the two fuel circuits;
- 2 day fuel tanks (1 per GE) connected to the two main fuel tanks (possibility to switch between the two).
- 4 pumps (2 per GE, pump 1 and pump 2) to convey the fuel from the main fuel tanks to the day fuel tanks.

- 2 "Pompier" valves (1 per GE) with safety contact to cut off the fuel circulation between the selected main fuel tank and the day fuel tank of the GE concerned.
- 2 "Police" valves (1 per GE) with safety contact to shut off the fuel flow between the GE and the day fuel tank of the GE.
- 2 fuse valves (1 per GE) with position contact in order to cut off (without human intervention) the fuel flow between the GE and the day fuel tank of the GE in case of fire.
- A leak detection station (VLR type), monitors the external double-walled pipes.
- A central leak detection station (Point Level Switch type), monitors leaks on the fuel oil network

C/ Fuel system of GEE and GEF

- The fuel system of GEE and GEF is composed of:
- 2 main fuel tanks of 40 000 liters, each associated with its own fuel circuit (circuit 1 and circuit 2)
- 8 motorized valves (per GE: 2 per fuel circuit, 1 flow valve and 1 return valve) which allow to switch between the two fuel circuits;
- 2 day fuel tanks (1 per GE) connected to the two main fuel tanks (possibility to switch between the two).
- 4 pumps (2 per GE, pump 1 and pump 2) to convey the fuel from the main fuel tanks to the day fuel tanks.
- 2 "Pompier" valves (1 per GE) with safety contact to cut off the fuel circulation between the selected main fuel tank and the day fuel tank of the GE concerned.
- 2 "Police" valves (1 per GE) with safety contact to shut off the fuel flow between the GE and the day fuel tank of the GE.
- 2 fuse valves (1 per GE) with position contact in order to cut off (without human intervention) the fuel flow between the GE and the day fuel tank of the GE in case of fire.
- A leak detection station (VLR type), monitors the external double-walled pipes.
- A central leak detection station (Point Level Switch type), monitors leaks on the fuel oil network

D/ Fuel system of GEG and GEH

- The fuel system of GEG and GEH is composed of:
- 2 main fuel tanks of 40 000 liters, each associated with its own fuel circuit (circuit 1 and circuit 2)
- 8 motorized valves (per GE: 2 per fuel circuit, 1 flow valve and 1 return valve) which allow to switch between the two fuel circuits;

- 2 day fuel tanks (1 per GE) connected to the two main fuel tanks (possibility to switch between the two).
- 4 pumps (2 per GE, pump 1 and pump 2) to convey the fuel from the main fuel tanks to the day fuel tanks.
- 2 "Pompier" valves (1 per GE) with safety contact to cut off the fuel circulation between the selected main fuel tank and the day fuel tank of the GE concerned.
- 2 "Police" valves (1 per GE) with safety contact to shut off the fuel flow between the GE and the day fuel tank of the GE.
- 2 fuse valves (1 per GE) with position contact in order to cut off (without human intervention) the fuel flow between the GE and the day fuel tank of the GE in case of fire.
- A leak detection station (VLR type), monitors the external double-walled pipes.
- A central leak detection station (Point Level Switch type), monitors leaks on the fuel oil network

7.2 OPERATION

The management of the fuel system is realized on the front of each GE cabinet through:

- 2 State switch for selecting the priority fuel pump (PUMP 1/PUMP 2);
- This switch is used to select the priority pump that conveys the fuel from one of the main fuel tanks to the day fuel tank. If one of the pumps fails, the automaton immediately switches to the other pump.

- Push-button for forced filling of the fuel tank (from the day tank);
- This push button allows to force the fill the day fuel tank (of the associated GE) to the high level.

- 3 State switch for priority fuel tank selection (CIRCUIT 1/AUTO/CIRCUIT 2) ;
- This switch is used to select the fuel circuit that supplies the day fuel tank concerned with fuel. In the AUTO position, if one of the circuits fails, the automated system immediately switches to the other circuit. In position CIRCUIT 1, the GE is supplied with fuel from the main tank 1 and remains locked even if there is a fault (same process in position CIRCUIT 2 from the main fuel tank 2).

If the selection of the fuel tank in operation is managed automatically via PLC (priority fuel tank selection selector in position: AUTO), by default, the main fuel tanks 1 and 3 are selected as priority in operation. The changeover from one fuel tank to another is done when one of these faults occurs:

- Low fuel level of the fuel tank in operation
- Fault of the outward fuel valve
- Fault of the return fuel valve
- Outward fuel valve in non-conductive position
- Return fuel valve in non-conductive position
- Fireman's valve in the non-conductive position
- Low fuel level of the the daily fuel tank

8 OPERATIONAL PRINCIPLE OF BACKUP POWER STATION

The operation described below is identical for all gensets.
Initial conditions:

On the front panel of the GE cabinet:

- The 3-position switch for the genset control is on the AUTO position.
- The 2-position switch for the genset circuit breaker control (QGEX) is in the AUTO position.
- The 2-position control load bank/Mobile genset switch disconnector (IGEX) is in the AUTO position.
- The 2-position switch for genset selection is in the GENSET position.
- No led is lit

Inside the GE cabinet:

- The 2-position switch for activating the downgraded mode is on the NO position.

Note: The control of the source inverters in the TGT BQs is not managed by the ENERIA automaton system.

8.1 MODE AUTOMATIQUE - AUTOMATIC MODE

The TGT BQ's source inverter is on the normal position and mains power supply is present.

Mains failure detected by the TGT BQ's source inverter.

The GE cabinet receives a start command (via a self-maintained dry contact) from the TGT BQ's source inverter.

After a "confirmation delay" (confirmed by the customer), the PLC sends a start command to the genset.

The genset starts, increases voltage and frequency up to 400 V and 50 Hz.

The PLC sends an order to close the genset breaker (QGEX).

Automatic switchover of the TGT BQ's source inverter to the emergency position (not managed by the Eneria's automaton).

The loads associated with the TGT BQ source inverter are supplied by the genset. The reloading is managed by the TGT BQ's automatic control system.

Here is a summary of the steps involved in supplying power to the site via the genset:

1- *Mains loss detection (T0)*
2- *Confirmation of mains loss (T0+5')*
3- *The start command is sent to the genset by the PLC and the genset starts up (T0 +5').*
4- *QGEX genset circuit breaker closing command from the PLC (T0 + 6').*
5- *The source changeover switch switches to the emergency position (T0+6').*
6- *Site power supply (T0 + 6').*

8.2 END OF AUTOMATIC MODE

When the main power supply returns, the TGT BQ source inverter switches to the normal position (not managed by the Eneria's automaton system).

The GE cabinet no longer receives a start command.

After a confirmation delay, the PLC sends a command to open the genset circuit breaker (QGEX).

The PLC releases the start contact of the genset.

The genset proceeds to a cooling down phase and then stops.

Here is a summary of the steps involved in returning to the sector:

1- Mains return detection (TR)
2- Mains return confirmed (TR+60')
3- Start command sent to the genset by the cancelled PLC (TR +60').
4- Order to open the QGEX genset circuit breaker by the PLC (TR + 61').
5- Changeover switch to normal position (TR+61').

6- Mains power supply to the site (TR + 61').
7- Generator cools down (no-load run) then stops (for 3 min).

8.3 NO-LOAD TEST

The TGT BQ's source inverter is on normal position (mains).

The user turns the genset control switch to the MANU position and presses the "genset start" push-button.

The PLC sends a start command to the genset.

The genset starts, increases voltage and frequency up to 400 V and 50 Hz.

The genset works without loads. The loads associated with the source inverter of the TGT BQ are always supplied from the main power supply.

***NOTE**: It is possible to close the genset breaker (QGEX) manually in order to test its interlocking during a no-load test.*

The user turns the genset breaker control switch to the MANU position and presses the "ENCLENCHEMENT" push-button.

The GE flows on the TGGE, but the loads associated with the TGT BQ's source inverter are still powered from the main power supply.

8.4 END OF NO-LOAD TEST

The user turns the genset control switch to the AUTO position.

The PLC sends a command to open the genset circuit breaker (QGEX) (if the operator has closed the circuit breaker in MANU).

The PLC releases the start contact of the genset.

The genset stops.

The user turns the genset breaker control switch to the AUTO position.

8.5 LOAD TEST WITH LOAD BENCH

The TGT BQ voltage failure has priority, as soon as the TGT BQ voltage failure occurs during a test, the load bank switch opens and the genset is available for emergency operation.

A load bank has been connected to the load bank/mobile genset switch disconnector (IGEX).

The TGT BQ's source inverter is on normal position (mains).

The user turns the genset control switch to the TEST ON LOAD BANK position.

The PLC sends a start command to the genset.

Closing of the load bank/mobile genset switch disconnector (IGEX) by the automaton of the GE cabinet.

The genset starts, increases voltage and frequency until it reaches 400 V and 50 Hz.

The PLC sends an order to close the genset breaker (QGEX).

Closing of the load bank/mobile genset switch disconnector (IGEX) by the automaton of the GE cabinet.

The genset supplies the load according to the power selected on the load bank.

The loads associated with the TGT BQ's source inverter are always supplied from the HTA.

8.6 END OF LOAD TEST WITH LOAD BENCH

The user deactivates all loads from the load bank.

The user turns the genset control switch to the AUTO position.

Opening of the load bank/mobile genset switch disconnector (IGEX) by the genset control panel.

The PLC sends a command to open the genset circuit breaker (QGEX).

The PLC releases the start contact of the genset.

The genset stops.

8.7 END OF AUTOMATIC MODE WITH MOBILE GENSET

Note: this automatic operating mode with mobile unit is only possible if:

- The genset associated with the GE cabinet is in safety mode;
- The genset circuit breaker (QGEX) is open;
- There is no emergency stop coming from the TGT BQ;
- That the Genset selection key switch is in the OUTDOOR GENSET position.

A mobile genset has its power connected on the load bank/mobile genset disconnector (IGEX), the 400Vac 3P+N power supply of its auxiliaries is connected on one of the 2 Auxiliaries cabinets, its "on/off" command is connected on the GE Cabinet.

On the front of the cabinet, the user turns the Genset selection key switch to the position MOBILE GENSET

The TGT BQ's source inverter is in the normal position and mains power is present.

Mains failure detected by the TGT BQ power switch.

The GE cabinet receives a start command (via a self-maintained dry contact) from the TGT BQ source changeover switch.

The genset associated to the GE cabinet is safe, the generator breaker (QGEX) is open AND there is no emergency stop coming from the TGT BQ.

The GE cabinet closes the load bank/mobile genset switch disconnector (IGEX)

The GE cabinet sends a start command to the mobile genset.

The mobile GE starts up, increases voltage and frequency up to 400 V and 50 Hz and closes its circuit breaker (this circuit breaker is integrated in the mobile unit).

Automatic switching of the TGT BQ source inverter to the emergency position (not managed by the Eneria automaton).

The loads associated with the TGT BQ's transfer switch are powered by the mobile genset.

8.8 END OF AUTOMATIC MODE WITH MOBILE GENSET

When the normal voltage returns, the TGT BQ source inverter switches to the normal position (not managed by the Eneria automaton system).

The genset cabinet no longer receives a start command.

The GE cabinet opens the load bank/mobile genset switch disconnector (IGEX)

The genset cabinet releases the starting contact of the mobile genset.

The mobile GE proceeds to a cooling down phase and then stops.

8.9 DEGRADE MODE (OPERATION WITHOUT PLCS)

The TGT BQ's source inverter is in the normal position and mains power is present.
Mains failure detected by the TGT BQ source inverter.

The cabinet receives a start command from the TGT BQ.

Due to the failure of the redundant PLCs, the unit does not start automatically.

The user checks the failure of the redundant PLC on the LED board. The "AUTOMATON DEFAULT" LED is lit.

The user checks the display board for normal voltage. The "MAIN WORK SHUTDOWN" LED is lit.

The user turns the degraded mode activation switch (10S1), located inside the genset cabinet to the "YES" position. The power to the PLCs and the touch screen is then switched off.

The user checks the activation of the degrade mode on the display board. The LED on the display board lights up the "ACTIVE DEGRADE MODE" indicator.

The user opens the manual flow and return valves (opening of motorized bypass valves) (11S3);

The user turns the genset control switch to the MANU position.

The user switches on the GENSET ON POWER switch.

The GE starts up, increases voltage and frequency until 400 V and 50 Hz are reached.

The user turns the control switch of the GE breaker to the "MANU" position.

The user presses the GENSET BREAKER (QGEX) CLOSE switch.

The generator breaker (QGEX) will close.

Automatic switching of the TGT BQ source inverter to the emergency position (not managed by the Eneria automaton system).

The loads associated with the TGT BQ power inverter are supplied by the genset.

8.10 END OF DEGRADE MODE (OPERATION WITHOUT PLCS)

When the normal voltage returns, the TGT BQ source inverter switches to the normal position (not managed by the Eneria automaton system).

The user verifies the return of normal voltage on the display board. The "MAIN WORK SHUTDOWN" indicator is off.

The user turns the genset circuit breaker control switch manually to the AUTO position.

The genset circuit breaker (QGEX) opens.

The user waits 3 minutes (to simulate the cooling of genset)

The user turns the genset control switch to the OFF position.

The GE stops.

9 INTERFACES WITH THE SITE

Below is a list of the interfaces between the GE cabinets / auxiliary cabinets and the site.

Power supply 400Vac 3P+N from the TGT BQ to the 8 GE cabinets:
- For each GE cabinet, 2 power supplies 25KVA from 2 different TGT BQs

Power supply 400Vac 3P+N from the TGT BQ to the 4 auxiliaries cabinets:
- For each auxiliaries cabinet, a 25KVA power supply from a TGT BQ

Exchanges between a TGT BQ and its associated GE cabinet:
In the direction TGT BQ to GE cabinet:
- TGT BQ fault: 2 separate dry contacts
- Emergency stop TGT BQ: 2 separate dry contacts
- TGT BQ voltage failure: 2 separate dry contacts

Exchanges between the site to each GE cabinet:
- Fire detection: 1 separate dry contact (8 contacts for the 8 gensets)

Exchanges between each GE cabinet to the site:
- Synthesis of GE's safeties: 1 dry contact
- Synthesis of GE's alarms: 1 dry contact

Exchanges between each GE cabinet and HVAC:
- Genset in operation: 1 dry contact

Communication between each GE cabinet and GTC:
- 1 link from each GE cabinet (8 links for the 8 GEs).